INFORMATIONAL LEAFLET NO. 164

A SUMMARY OF PRELIMINARY 1974 FORECASTS FOR ALASKAN SALMON FISHERIES

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ALASKA DEPARTMENT OF FISH AND GAME

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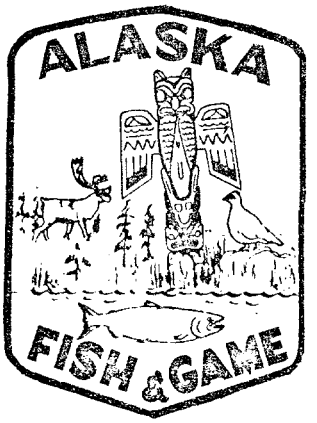

November 15, 1973

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SUMMARY

A 15.6 million commercial salmon harvest is projected for Alaskan fisheries in 1974. This would represent the smallest harvest since 1899 and would continue the pattern of below average salmon catches experienced in 1972 and 1973. Unusually severe winters in 1970-71 and 1971-72 appear to be primarily responsible for the depressed salmon returns of the last two years and are expected to adversely affect returns for several more years.

Of the 15.6 million salmon harvest projected for the state in 1974, 8.8 million or 56 percent are expected to be harvested in Southeastern Alaska fisheries. In the Central statistical region, including Prince William Sound, Cook Inlet, Kodiak, Chignik, and the Southside Peninsula, a harvest of only 4.8 million salmon is anticipated. A harvest of 2.1 million salmon is projected for the Western region which encompasses the North Side Peninsula, Bristol Bay and Arctic-Yukon-Kuskokwim areas.

The species composition of the anticipated 1974 salmon harvest is as follows: Chinook - 0.5 million (3%); coho - 1.1 million (7%); chum - 3.3 million (21%); sockeye - 3.3 million (21%); pink - 7.4 million (47%).

While projected 1974 harvest levels are below average for all species, the most significant weaknesses are in the pink and sockeye projections.

INTRODUCTION

In 1969 the Division of Commercial Fisheries, Alaska Department of Fish and Game, initiated an annual statewide salmon forecast report designed to present pre-season forecasts for Alaska's commercial salmon fisheries. Released in November, these reports make information available on salmon returns expected the following year to some of the major fisheries in the state. A projection of the total commercial salmon harvest for the state is also presented.

In order to provide pre-season forecast information at this time it is necessary to include in some analyses preliminary data collected during the season just ended. Special attention is drawn to the use of very preliminary data on commercial catches in 1973. Final compilation of commercial catch statistics will not be completed until the spring of 1974. Some differences, though generally minor, will exist between preliminary commercial harvest data used in this report and final data presently being compiled.

Salmon forecasts in this leaflet are, therefore, presented under preliminary status. Revision of data on which these forecasts are based and further analyses may require modification of preliminary forecasts. In the past, however, preliminary forecasts have not differed substantially from final forecasts. Final forecasts are published by the Department and/or are made available via the news media.

Past Pre-season Projections of Commercial Salmon Harvests

Pre-season projections of statewide commercial salmon harvests have been made annually since 1970. These projections and subsequent commercial salmon harvests are shown below: (Numbers of fish in millions)

Year	Pre-season Projected Harvest	Actual Harvest
1970	95.5	68.5
1971	41.5	47.5
1972	46.7	31.8 1/
1973	30.0	21.3 1/

1/ Preliminary data

Differences between predicted and actual harvest levels reflect the lack of complete information on salmon escapements, fry or smolt production

and subsequent survival of salmon during the course of a very complex life cycle. As the state of knowledge on factors affecting survival increases and data bases expand, forecasting of annual salmon returns should continue to improve.

The 1973 commercial salmon harvest of approximately 21 million salmon was the second smallest since statehood and continued the downward trend begun in 1972. Salmon catches in both of these years were below recent average levels and smaller than pre-season projections. This trend apparently resulted from abnormally cold winters in 1970-71 and 1971-72 and subsequent above average mortalities of juvenile salmon. As expected, the effect of these severe winters was first observed in pink salmon runs as this species has a characteristic two-year life cycle. Pink salmon catches in 1972 and 1973 were primarily responsible for the below average total salmon harvests although sockeye salmon runs in Western Alaska, particularly Bristol Bay, were also much smaller than normal.

Terminology and Definitions

Definitions of some key terms frequently used in this report are as follows:

Salmon return or run - the total number of salmon returning in a given year to Alaskan waters from ocean rearing areas. A portion of these returning salmon is normally harvested while the remaining fish are allowed to reach the spawning grounds.

Commercial catch or harvest - that portion of a returning salmon run harvested by commercial fisheries.

Escapement, spawning population or brood stock - that portion of a returning salmon run which is not harvested and survives to reach the spawning grounds.

Different common names are often used for a particular species of salmon. The scientific names and most frequently used common names for the five species of Pacific salmon are given below:

Scientific Name	Common Name
Oncorhynchus tshawytscha	king, chinook

Scientific Name	Common Name
Oncorhynchus nerka	red, sockeye
Oncorhynchus kisutch	coho, silver
Oncorhynchus gorbuscha	pink, humpback, humpy
Oncorhynchus keta	chum, dog, keta

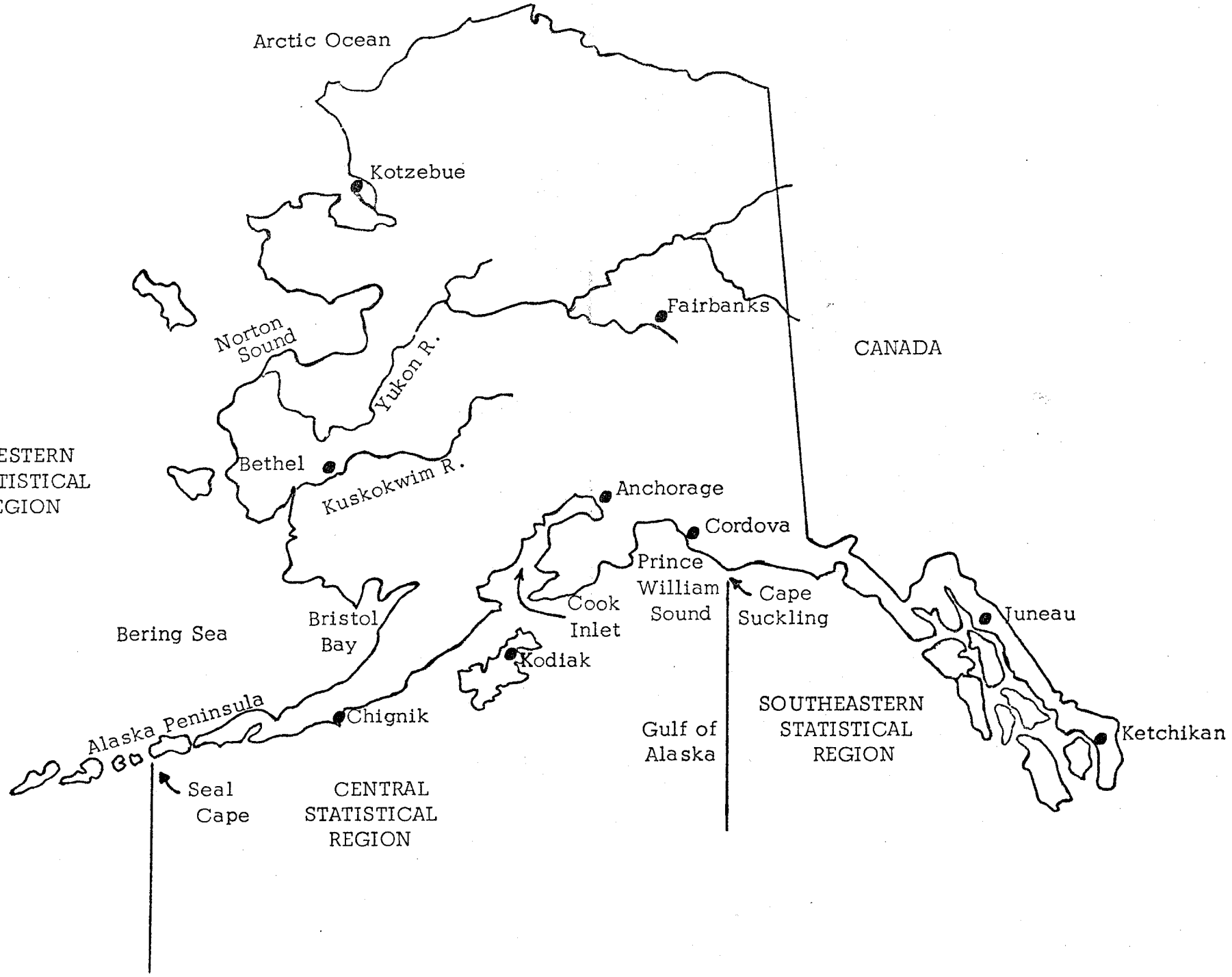
The three regions used for the purpose of this report are the statistical regions by which commercial fisheries statistics are presented in the Department's Statistical Leaflet series and in prior statistical reports. The boundaries of these regions are shown in Figure 1 and are defined as follows:

SOUTHEASTERN:	Dixon Entrance to Cape Suckling (including the Southeastern Alaska and Yakutat areas).
CENTRAL:	Cape Suckling to Seal Cape on the southwestern tip of Unimak Island (including the Copper River-Bering River, Prince William Sound, Cook Inlet, Kodiak, Chignik and South Side Alaska Peninsula areas).
WESTERN:	Seal Cape to, and including, the Aleutian Islands and the Bering Sea north through Kotzebue Sound (including the Aleutian Islands, North Side Alaska Peninsula, Bristol Bay, and Arctic-Yukon-Kuskokwim areas).

Acknowledgments

Materials presented in this report were prepared by Division of Commercial Fisheries biologists located in field offices throughout the state. Area biologists, not individually identified, contributed the materials for the discussion of the 1973 fishing season. Individual credit for forecast material is given following the area forecasts presented in Appendix A.

FIGURE 1. ALASKA DEPARTMENT OF FISH AND GAME COMMERCIAL FISHERIES STATISTICAL REGIONS.



REVIEW OF THE 1973 SEASON

The 1973 Alaska commercial salmon harvest of approximately 21-22 million salmon of all species reflected, for the second consecutive year, the effect of the unusually severe winters of 1970-71 and 1971-72. Since statehood, a catch of this small magnitude has occurred only one other year; in 1967 the commercial salmon harvest totaled only 20.9 million fish. By comparison, annual catches averaged 52 million during the period 1960-71.

Commercial salmon catches by species and fishing area in 1973 are shown in Table 1. As this information is compiled from preliminary inseason catch reports, some revisions will occur as final catch statistics are tabulated. Late reported catches are expected to contribute an additional 0.5 to 1.0 million fish to the 21.3 million catch shown in Table 1. Thus, the final 1973 commercial salmon harvest is expected to fall in the range of 21 to 22 million.

In 1973, as in 1972, the primary weakness in the statewide commercial salmon harvest stemmed from poor pink salmon runs in most areas. Preliminary reports indicate a pink salmon harvest of approximately 9.4 million in 1973 compared with 15.9 million in 1972 and an average annual harvest of 29.4 million during the period 1960-71.

The 9.4 million pinks taken in 1973 was roughly half the expected harvest of 18.5 million. This difference was due primarily to two major pink fisheries. Pink runs to Southeastern Alaska, expected to contribute 10.0 million harvestable fish, were below predicted levels and a catch of 6.0 million or 60 percent of expected was taken. In the Kodiak area, a catch of 0.5 million pinks accounted for only 8 percent of the pre-season prediction of 6.5 million. Pink salmon harvests in these two areas thus fell some 10 million fish short of the level predicted prior to the season.

In another major pink salmon fishery, however, Prince William Sound fishermen harvested 2.1 million fish, nearly 1 million more than the expected 1.2 million but still within the predicted harvest range of 0 - 2.8 million. Pink salmon fisheries other than the three major ones already discussed contributed another 0.8 million fish, comparing closely to the pre-season projection of 1.2 million.

A below normal sockeye harvest of 4.8 million had been projected prior to the 1973 season. This projection proved to be substantially correct as approximately 4.5 million sockeye were harvested. In Bristol Bay only 760,000 sockeye were taken during the poorest season on record. This was even below the record low of 1.5 million predicted prior to the season.

TABLE 1. PRELIMINARY 1973 ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND MAJOR FISHING AREAS (Compiled 11/7/73).

(Numbers of fish in thousands)

AREA	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	Total
Southeastern Alaska	319.1	864.4	722.0	6026.5	1277.1	9209.1
Yakutat	2.5	131.4	34.0	16.7	10.0	194.6
SOUTHEASTERN REGION SUBTOTAL	321.6	995.8	756.0	6043.2	1287.1	9403.7
Prince William Sound	20.6	473.8	199.3	2076.3	736.3	3506.3
Cook Inlet	5.3	699.3	106.1	633.5	783.1	2227.3
Kodiak	0.8	167.4	3.5	503.5	318.8	994.0
Chignik	0.5	864.0	22.3	25.4	8.7	920.9
Alaska Peninsula - S. Side	0.4	330.2	6.6	58.6	316.7	712.5
CENTRAL REGION SUBTOTAL	27.6	2534.7	337.8	3297.3	2163.6	8361.0
Alaska Peninsula - N. Side	4.1	172.4	18.0	0.1	155.8	350.4
Aleutian Islands	-	0.1	-	6.8	-	6.9
Bristol Bay	43.7	756.6	53.5	0.2	710.8	1564.8
Arctic-Yukon-Kuskokwim	126.8	5.6	194.4	47.1	1212.0	1585.9
WESTERN REGION SUBTOTAL	174.6	934.7	265.9	54.2	2078.6	3508.0
TOTAL ALASKA	523.8	4465.2	1359.7	9394.7	5529.3	21272.7

Tending to offset this difference between predicted and actual harvest in Bristol Bay was the 860,000 sockeye harvest in Chignik where a harvest of only 190,000 fish had been expected. Sockeye harvests in other areas of the state were generally below average with the exception of Southeastern Alaska which experienced stronger than normal sockeye returns.

Statewide commercial catches in 1973 of 520,000 chinook, 1.4 million coho and 5.5 million chum salmon compared favorably with preseason projections of 560,000, 1.0 million and 5.2 million of the respective species. While the 1973 catches were somewhat below the 1960-71 average annual catches of 580,000 chinook, 1.8 million coho and 5.7 million chums, they were much stronger relatively speaking than pink and sockeye catches.

Additional comments on the 1973 commercial fishing season in specific areas are presented below. All commercial catch statistics are preliminary.

Southeastern Alaska and Yakutat

The 1973 Southeastern pink salmon harvest of 6.0 million accounted for only 60 percent of the expected harvest of 10.0 million. By comparison, the average odd-year harvest since 1961 has been 10.0 million, coincidentally the same as the predicted 1973 pink salmon harvest. Catches were smaller than average and below expectations in both the Northern and Southern areas reflecting for the second consecutive year the effect of recent cold winters on pink salmon survival. In Northern Southeastern, the catch of 1.8 million pinks more closely met the expected harvest of 2.0 million than in Southern Southeastern where a 4.2 million catch represented only about 50 percent of the expected 8.0 million harvest. In both sections, total returns were weaker than anticipated necessitating additional reductions in fishing time in an attempt to achieve desired escapement goals.

The 1973 chum salmon catch of 1.3 million was about 65 percent of the 1960-72 average catch of 2.0 million. Also below average were the coho and chinook harvests of 580,000 and 250,000 respectively which amounted to 52 and 85 percent of the 1960-72 average harvest levels.

The sockeye harvest of almost 1 million fish in the Southeastern and Yakutat areas was the largest since 1967 and exceeded the 1960-72 average harvest of 820,000 by about 20 percent.

Prince William Sound

A commercial harvest of 2.1 million pink salmon exceeded the 1.5 million pre-season forecast by about one third but fell within the predicted harvest range of 0-2.8 million. This was a below average harvest for the Prince William Sound fishery as odd-year pink salmon catches since 1960 have averaged 4.1 million.

The 1973 chum salmon harvest of 740,000 substantially exceeded the expected harvest of 440,000 and was the third largest catch since 1960.

A total of 470,000 sockeye were harvested commercially in the Prince William Sound area, the majority coming from the Copper River fishery. This was only slightly more than half of the 1960-72 average annual harvest of 810,000 sockeye for this area. The 20,600 chinook harvest, also taken predominantly in the Copper River fishery, was the largest since the early 1950's.

The coho catch of approximately 200,000 was slightly below average.

Cook Inlet

The commercial harvest of salmon of all species totaled 2.2 million for Cook Inlet fisheries in 1973. This was nearly the same as the 1972 harvest of 2.3 million. About 95 percent of the 1973 harvest consisted of chum (780,000), sockeye (700,000) and pink salmon (630,000) with chinook and coho salmon contributing the remaining 5 percent.

The 1973 pink salmon harvest of 630,000 was the largest odd-year harvest since 1960 and was more than double the odd-year average of 300,000. The sockeye harvest of 700,000 represented about 65 percent of the 1.1 million average annual harvest since statehood. The 780,000 chum harvest slightly exceeded the 1960-72 average harvest of 720,000.

Kodiak

The 1973 Kodiak salmon season was dominated by a disasterous pink salmon return with the harvest of 500,000 pinks being the second smallest since 1921. Only 188,000 pinks were harvested in 1967 when a closure of the pink salmon fishery was in effect. In 1973, the pink salmon fishery was closed on July 25 during the normal peak week of the odd-year pink fishery and remained closed for the duration of the pink season. As in most other major pink salmon fisheries in the state, the unusually cold winter of 1971-72 was primarily responsible for the poor pink return to the Kodiak area.

Catches of other species were also below average in 1973. The sockeye catch of 170,000 only slightly exceeded the lowest catch of 164,000 in 1955. The chum catch of 320,000 represented only about one-half of the 1960-72 average catch of 770,000 chums.

Chignik

A much stronger than expected sockeye return to Chignik resulted in a harvest of 860,000 sockeye. Prior to the season a catch exceeding 420,000 appeared unlikely and a catch of about 200,000 was thought more probable. The early or Black Lake run contributed some 580,000 harvestable sockeye with the remaining catch coming from the late or Chignik Lake run. The total sockeye return, catch plus escapement, exceeded 1.6 million and provided one of the few bright spots in the 1973 Alaska salmon fisheries.

As predicted last November, pink and chum runs to the Chignik area in 1973 were very weak with less than 30,000 pinks and 10,000 chum salmon being taken in the commercial harvest.

Alaska Peninsula and Aleutian Islands

Preliminary catch reports indicate a harvest of 1.1 million salmon of all species in the Alaska Peninsula-Aleutian Island fisheries. This was even less than the 1.4 million harvest in 1972 which was considered poor. The commercial salmon catch in these fisheries normally ranges between two and four million.

Pink salmon runs generally contribute the major portion of the commercial salmon harvest in this area with catches normally ranging from one to two million. In 1973, the pink catch was about 70,000 indicating the extremely poor survival of fish spawned in 1971.

Sockeye salmon catches of approximately 500,000 accounted for nearly half of the total salmon harvest and the chum harvest of 470,000 contributed about 40 percent.

Bristol Bay

The 1973 Bristol Bay run was forecasted at 6.2 million, but only 2.4 million fish arrived inshore. The run was the smallest recorded since the inception of the fishery and only 39% of the forecast. Information from the Fisheries Research Institute had indicated a run as low as 2.8 million might

be expected on the basis of high seas sampling. Catches at the False Pass-Unimak fisheries, and on the high seas by the Japanese, did not however indicate the run would be below the 6.2 million forecast, and the Port Moller test fishing program gave an even higher estimate of about 8.2 million inshore sockeye.

When the sockeye failed to arrive at predicted strength in the inshore fishing districts, a very conservative approach was taken to district management. Prior to the fishing season a sliding gear scale put into effect in Bristol Bay by the Board of Fish and Game reduced gear per drift fisherman from 150 to 25 fathoms, and gear per set net fisherman from 50 to 12-1/2 fathoms. Even with this reduced effort, only two to four 12-hour fishing periods were allowed in the commercial fishing districts during the normal fishing dates. These were exploratory fishing period designed to provide an assessment of actual run strength. Total hours of fishing time was the least in the history of the fishery, and in many systems the catch was smallest ever. The Naknek-Kvichak district produced a catch of only 170,000 sockeye in two 12-hour fishing periods during the peak of the run. During the peak in other districts, Egegik produced 210,000 in three 12-hour periods, and Nushagak 270,000 in four 12-hour periods. The total 1973 sockeye catch was only 750,000.

Sockeye escapements reached only 1.7 million, 35 percent of the required 4.8 million. In the Kvichak, where 2.0 million were anticipated, the escapement was only 230,000. The Egegik escapement of 330,000 was 66 percent of its goal, and Nushagak, with 580,000 reached 55 percent of its goal. Only the small Togiak system with an escapement of 115,000 reached and exceeded its modest goal of 80,000.

The harvests of other salmon in 1973 consisted of only 810,000. The king salmon harvest of 44,000 was the smallest harvest since 1953, and only 42 percent of the 105,000 average catch. Pink salmon were predictably low because Bristol Bay pink salmon occur only in even years. The coho harvest of 53,000 was well above the 21-year average of 38,300. The other species that came in above average was chum salmon, which yielded 710,800 compared to a 21-year average of 522,400.

Arctic-Yukon-Kuskokwim

The 1973 commercial salmon harvest of 1.6 million fish was the largest recorded, surpassing the previous high made in 1970 by nearly 600,000 fish. Record catches were recorded for chum (1,212,000) and coho salmon (194,000). The king salmon harvest of 127,000 was however the smallest since 1966 and 16,000 below the previous 12-year average. Other catches include 5,500 sockeye and 47,000 pink salmon. By management area, commercial catches of

salmon of all species were Kuskokwim--388,000, Yukon--641,000, Norton Sound--177,000 and Kotzebue--380,000. Primarily due to increased prices, all areas experienced above average fishing effort in 1973.

Chum and coho salmon runs were average or above average in magnitude in most areas. The Kotzebue area chum salmon harvest and run was the largest ever documented since monitoring of this fishery began in 1962. King salmon runs to all areas were below average.

PRELIMINARY FORECASTS OF TOTAL SALMON RETURNS TO SOME MAJOR ALASKAN FISHERIES IN 1973

The Department's salmon management program includes a number of projects designed to provide pre-season forecasts of total salmon returns to some of the major salmon fisheries throughout the state. Areas and species on which intensified forecast research is presently being conducted were chosen on priority basis relative to economic importance, potential predictability of annual returns and compatibility with existing programs. The Department's forecasting program is being expanded as funding permits.

These intensified forecasting programs are generally designed to provide a more reliable forecasting basis than merely number of spawners in parent years. This may include more refined information on spawning distributions, survival to an intermediate life stage, population age compositions or some combinations of these factors. In addition to forecasts of total salmon returns to an area, information on the relative strength of returns to specific districts or systems obtained from these studies provides for more efficient management of these stocks.

Salmon stocks included in these intensified forecast studies have contributed from 50 percent to 70 percent of the total statewide salmon harvest in recent years.

Comparison of 1973 Forecasts with Actual Returns

Only a very cursory review of the accuracy of the 1973 salmon forecasts will be presented here. More thorough discussions of forecast accuracy and factors thought to be responsible for differences between pre-season forecasts and actual 1973 returns will be given in individual forecast reports in which final 1974 forecasts are made for specific salmon fisheries.

In Table 2, the 1973 pre-season forecasts of November 1972 are compared with actual 1973 returns. It should be noted that total returns, that is catch plus escapement, and forecasts of total returns are presented in the table. For the purpose of this report, the percentage forecast error is calculated by expressing the difference between forecast and actual return as a percent of the forecast rather than the return. This measure of error can then be directly applied to future forecasts prior to knowing actual returns to estimate the magnitude of variations which might occur between expected and actual returns.

TABLE 2. COMPARISON OF PRELIMINARY 1973 SALMON RETURNS WITH PRE-SEASON FORECASTS FOR SOME MAJOR ALASKAN SALMON FISHERIES 1/

Number of Fish in Thousands

Area	Species	Pre-season Forecast 2/ Range	Pre-season Forecast 2/ Point	Preliminary Return	Forecast Error 3/ Number	Forecast Error 3/ Percent
Southern Southeastern	Pink	11,300-16,700	14,000	7,900	+ 6,100	+ 44
Northern Southeastern	Pink	3,500- 8,500	6,000	3,800	+ 2,200	+ 37
Southeastern Subtotals	Pink	14,800-25,200	20,000	11,700	8,300	+ 42
Prince William Sound	Pink	1,100- 4,300	2,700	3,310	- 610	- 23
	Chum	360- 930	640	1,280	- 640	- 100
Kodiak	Pink	3,600- 9,700	7,800	980	+ 6,820	+ 87
Chignik	Sockeye	530- 1,070	780	1,640	- 860	- 110
	Pink	4/	400	184	+ 216	+ 54
	Chum	4/	130	126	+ 4	+ 3
Bristol Bay	Sockeye	4/	6,200	2,430	+ 3,770	+ 61

1/ Formal forecasts of total salmon returns are available only for those areas and species listed above.

2/ Pre-season forecasts of November, 1972.

3/ Forecast errors are computed from point forecasts. Percent errors are computed from forecasts.

4/ Forecast ranges not available.

The 1973 Southeastern Alaska pink salmon run of approximately 11.7 million fell below the predicted 20.0 million return by 8.3 million fish or 42 percent. In terms of numbers of fish, the major difference occurred in southern Southeastern where 7.9 million pinks returned compared to a predicted 14.0 million return. In northern Southeastern the return of 3.8 million was 37 percent below the prediction of 6.0 million. In both the northern and southern areas, available data suggests that, as a result of unusually cold temperatures, above average mortality occurred after pre-emergent fry sampling was conducted in the spring of 1972. This data is presented in the 1974 Southeastern Alaska pink salmon forecast report 1/ and similar data is being incorporated in future forecasts in an attempt to improve their accuracy.

The return of 3.3 million pink salmon to Prince William Sound in 1973 was within the predicted range of 1.1 to 4.3 million and only exceeded the point forecast of 2.7 million by 23 percent. The pink salmon forecast program in this area has proven to be the most successful one to date in Alaska. The 1973 chum return, however, totaled 1,280,000, doubled the pre-season forecast of 640,000 and even exceeded the upper end of the predicted range of 360,000 to 930,000 fish.

Preliminary reports indicate that the total pink salmon return to the Kodiak Island area in 1973 was only 980,000 in contrast to an expected return of 7.8 million. Although the point forecast of 7.8 million was made prior to the season, it was emphasized that factors related to abnormally cold weather in the winter and spring of 1971-72 made a return in the lower end of the forecast range, i.e., 3.6 to 7.8 million, much more likely. Not even these conservative expectations were met however. The 1973 return of less than one million pink salmon was the second smallest return on record and only exceeded the 1967 return of 680,000.

Returns of 780,000 sockeye, 400,000 pink and 130,000 chum salmon were forecast for the Chignik area in 1973. Preliminary catch and escapement data indicates actual returns of 1.6 million sockeye, 184,000 pink and 126,000 chum salmon. The much stronger than expected sockeye return was due to a 1.1 million return to the early or Black Lake system in contrast to a predicted return of 340,000 sockeye. The late or Chignik Lake system contributed 530,000 sockeye, slightly above the forecast of 440,000. The very weak returns of pink and chum salmon which were expected prior to the season

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1/ Forecast of the 1974 Pink Salmon Runs, Southeastern Alaska. By Kenneth E. Durley. Alaska Department of Fish and Game. In print.

did occur and few fish of these species were harvested.

The 1973 inshore return of 2.4 million sockeye to Bristol Bay was only 39 percent of the 6.2 million forecast and was the smallest return on record. Returns to 8 of the 11 systems were below forecasted levels with returns exceeding forecasts for only three smaller systems. The Kvichak River, which in peak years dominates the Bristol Bay run, received only 12 percent or 285,000 of an expected 2.4 million return.

Preliminary 1974 Forecasts

Forecasts of 1974 returns to major Alaskan salmon fisheries for which forecasts of total returns are available are summarized in Table 3. Point and range forecasts are given for both total returns and harvest levels for most of these runs. As indicated above, salmon runs discussed in the section generally contribute 50 to 70 percent of the state's total commercial salmon harvest.

Pink salmon returns predicted for Southeastern Alaska, Prince William Sound, the Southern and Outer districts of Cook Inlet, Kodiak, Chignik and Bristol Bay in 1974 total 21.8 million. A harvest of approximately 6.8 million pinks is expected from these runs. The relatively low rate of harvest in 1974 is due to the fact that these pink salmon runs have recently been depressed to a substantial degree below optimum levels and larger than normal proportions of the returns must be allocated to spawning if these runs are to be returned to higher levels of production. While there is evidence that in some areas pink salmon spawned in 1972 and expected to return in 1974 encountered more favorable climatic conditions than the previous two cycles, the 1972 pink returns to many areas were so depressed that escapements fell substantially below optimum levels. This is partially responsible for the generally poor pink salmon returns predicted for 1974.

Pink salmon returns of 9.3 million and 6.8 million are predicted for Northern and Southern Southeastern Alaska respectively in 1974. With escapement goals of 4 million and 6 million for the Northern and Southern areas, catches of 5.3 million and 800,000 pinks are expected. This would represent a total pink salmon harvest of 6.1 million for Southeastern Alaska in 1974, nearly the same as the 6.0 million harvest in 1973. By comparison, even-year pink catches since 1950 have ranged from 3.0 million in 1960 to 25.1 million in 1968.

TABLE 3. PRELIMINARY FORECASTS OF TOTAL SALMON RETURNS TO SOME[1/] MAJOR ALASKAN FISHERIES IN 1974
(Number of fish in thousands)

Area	Species	Forecasted Total Return		Estimated Harvest	
		Range	Point	Range	Point
Southern Southeastern	Pink	4,400 - 9,200	6,800	0 - 3,200	800
Northern Southeastern	Pink	7,400 - 11,200	9,300	3,400 - 7,200	5,300
Southeastern Subtotals	Pink	11,800 - 20,400	16,100	3,400 - 10,400	6,100
Prince William Sound	Pink	300 - 3,700	2,000	0 - 2,200	500
	Chum	140 - 450	290	0 - 250	90
Cook Inlet - Southern and Outer Districts	Pink	2/	340	2/	90
Kodiak	Pink	1,900 - 5,300	2,900	0 - 2,550	150
Chignik	Sockeye	650 - 1,420	990	30 - 800	370
	Pink	2/	200	Negligible	
	Chum	2/	50	Negligible	
Bristol Bay	Sockeye	2/	5,000		200
Bristol Bay - Nushagak District	Pink	200 - 400	300	Negligible	
TOTALS			27,830		7,500

1/ Formal forecasts of total salmon returns are presently available only for those areas and species listed above.
2/ Forecast ranges not available.

In Prince William Sound, a 2.0 million pink salmon return has been forecast for 1974. The corresponding forecast range is 300,000 to 3.7 million and it appears more likely that the return will fall in the lower part of the range, that is between 300,000 and 2.0 million. If the return is near the 2.0 million point forecast, a harvest of about 500,000 fish could be allowed while still meeting the 1.5 million spawner requirement. Since 1950, even-year pink catches have varied from 60,000 in 1972 to 6.7 million in 1962. In 1972, the total return, catch plus escapement, was approximately 700,000 pinks and although nearly all of these were allowed to spawn, it represented less than half of the required escapement. This is reflected in the low 1974 pink forecast.

In Kodiak, the state's other major pink salmon fishery, the outlook for 1974 is as poor as in Prince William Sound. A total predicted return of 2.9 million pinks for the Kodiak Island area would provide for a harvest of only about 150,000 fish if escapement requirements of 2.5 to 3.0 million are to be met. As in other areas, Kodiak area pink salmon escapements in the parent year 1972 fell below optimum levels as the result of a very poor return.

Forecasts are also available for three other pink salmon fisheries in 1974, the Southern and Outer districts of Cook Inlet, Chignik and the Nushagak district of Bristol Bay. Point forecasts of total returns are respectively 340,000, 200,000 and 300,000 fish. As these forecasts are all substantially below normal levels of returns, expected pink salmon catches are minimal with 90,000 fish being indicated for the Cook Inlet area (Southern and Outer districts) and little if any available harvest for the Chignik and Bristol Bay areas. (The Nushagak district generally contributes in excess of 90 percent of the total Bristol Bay pink salmon harvest.)

Chum salmon forecasts are presently available for only two areas, Prince William Sound and Chignik. Most chum salmon mature and return as 4-year fish and, therefore, the majority of fish expected to return in 1974 would be from the 1970 brood year. A lesser contribution of 3-year fish would be expected from 1971. As pink and chum salmon have similar freshwater life histories - both species utilize similar spawning areas and migrate seaward in the spring after they are spawned - the same severe winter conditions which apparently caused greater than normal mortalities in pink salmon spawned in 1970 and 1971 probably had a similar effect on chum salmon spawned in those years. This is, in fact, reflected in the 1974 chum salmon forecasts of 290,000 for Prince William Sound and 50,000 for Chignik. Both forecasts indicate below normal runs and while a below average harvest of 90,000 chums is projected for Prince William Sound, no significant harvest of chums is expected in the Chignik area.

Forecasts of total sockeye salmon returns are made for the Bristol Bay and Chignik fisheries. The total return of sockeye to Bristol Bay in 1974 is expected to total only 5.0 million fish. Any harvests of Bristol Bay sockeye by foreign fisheries in 1974 would further reduce the expected return. With basic escapement requirements of 9.5 million sockeye or nearly double the expected return, no fishing is anticipated during the sockeye season except in the Togiak district where about 200,000 fish may be available for harvest. While fisheries on other species may harvest some sockeye, fishery regulations will be designed to minimize this incidental harvest.

A return of approximately 990,000 sockeye is expected for the Chignik area. About 40 percent or 400,000 fish are expected in the early run (prior to July 1) and the remaining 60 percent in the late run. An escapement goal of about 620,000 fish would indicate an allowable harvest of 370,000 sockeye. However, if the actual run falls near either extreme of the forecast range of 650,000 to 1.4 million, the number of fish available for harvest would change substantially.

Additional information on forecast techniques, relative strength of returns to specific districts or systems, potential problems anticipated for the 1974 season and other items of interest related to the above forecasts are presented in Appendix A.

Salmon runs for which forecasts of total returns have been presented above are expected to contribute an estimated 7.5 million salmon to the 1974 Alaskan commercial salmon harvest. By comparison, these runs contributed 11.6 million in 1973, 17.4 million in 1972, 32.8 million in 1971 and 49.6 million in 1970. Again, these statistics do not represent total state salmon catches but only catches from those salmon runs listed in Table 3.

In the following section, the estimated allowable harvest from salmon stocks discussed above is combined with projected harvests from other salmon stocks to provide a projection of the total state salmon harvest for 1974.

PROJECTED TOTAL COMMERCIAL SALMON HARVEST FOR ALASKAN FISHERIES IN 1974

Pre-season forecasts of salmon runs and anticipated harvests for specific area fisheries are essential to the operational planning of persons directly involved with these fisheries. However, information on the expected total Alaska salmon production is also important to agencies, industries or persons involved in fisheries in many or all areas of the state such as industry suppliers, the transportation industry and the State government (for projection of state revenues). Consequently, the Department is continuing efforts to develop a basis for providing useful and accurate pre-season estimates of total state salmon production.

For salmon fisheries not discussed in the previous section, it is generally necessary to base pre-season estimates of harvest on recent harvest trends. Projections based on this method will generally reflect more variation from actual harvests as adjustments are not made for variations in brood stock abundance or annual survival rates.

Because of the strong evidence of abnormally high mortalities being induced in Alaska salmon stocks by the severe winters of 1970-71 and 1971-72, the trend of reduced salmon harvests experienced in 1972 and 1973 has been taken into account in projecting the statewide salmon harvest for 1974. As shown below, salmon spawned in 1970 and 1971 would normally be expected to be major contributors to the 1974 return.

Primary Brood Years Contributing to the 1974 Salmon Return

Species	Age of Returning Salmon in Years				
	2	3	4	5	6
Pink	1972				
Chum		1971	1970		
Coho		1971	1970		
Sockeye			1970	1969	1968
Chinook			1970	1969	1968

Note: The above age classes generally contribute in excess of 90 percent of adult salmon returns.

Pink salmon returns in 1974, while eminating from the 1972 brood year spawning, will indirectly reflect the poor survival of fish spawned in 1970. Pink salmon escapements in 1972 - returning from the 1970 brood year - were below optimum levels in many areas of the state with the result that 1974 returns are expected to be substantially below normal. Nearly all chum and coho salmon returning in 1974 will be from 1970 and 1971 while sockeye and chinook will primarily be the return of salmon spawning in 1968, 1969 and 1970. There is also evidence that some salmon spawned prior to 1970 but migrating seaward in the spring of 1971 or 1972 sustained unusual mortalities. This is particularly evident in recent sockeye returns to Bristol Bay.

A total commercial harvest of 15.6 million salmon of all species is projected for Alaskan fisheries in 1974. Expected salmon harvests by statistical region and species are shown in Table 4. Also shown in Table 4 is the projected 1974 salmon case pack of 830,000 48-pound cases and the estimated production of 37.0 million pounds of fresh/frozen and cured salmon products. These last two estimates are based on the assumption that relative demands for canned salmon and for fresh/frozen and cured salmon products in 1974 will be similar to that of 1973. In 1973 a much greater proportion of commercially harvested salmon were processed as fresh/frozen and cured products than in previous years.

The Southeastern statistical region, that area of the state from Yakutat southward, is expected to produce about 8.8 million fish or 56 percent of the 1974 state salmon harvest. The Central statistical region, including Prince William Sound, Cook Inlet, Kodiak, Chignik and the southside of the Peninsula, is expected to produce 4.8 million salmon or 31 percent of the state harvest. The remaining 2.1 million salmon or 13.2 percent is expected from the Western region which includes the North Side Peninsula, Bristol Bay and Arctic-Yukon-Kuskokwim fisheries.

In terms of numbers of fish, pink salmon are expected to contribute nearly half or 47 percent of the 1974 salmon harvest. Sockeye and chum salmon are each expected to account for 21 percent with coho and chinook contributing 7 and 3 percent respectively.

The projected 1974 pink salmon harvest of 7.4 million fish would be the smallest since 1967 when 6.6 million pinks were harvested in Alaskan fisheries. Prior to 1967, however, a pink catch of this magnitude has not occurred since 1905 when a 3.4 million harvest was recorded. The 3.3 million sockeye catch expected in 1974 would be the smallest since the 3.2 million catch which occurred in 1888 during the developmental period of Alaska's salmon fisheries.

TABLE 4. PROJECTED 1/ TOTAL COMMERCIAL SALMON HARVESTS BY ALASKAN FISHERIES IN 1974.

Number of Fish in Thousands

Statistical Region	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeastern	300	800	750	6,100	800	8,750
Central	40	2,100	200	1,200	1,270	4,810
Western	190	400	140	80	1,260	2,070
Total Alaska	530	3,300	1,090	7,380	3,330	15,630
Estimated number of 48-lb. cases in thousands 2/	10	250	20	340	210	830
Estimated production of fresh/frozen and cured salmon products in 1000's of pounds	9,030	5,740	6,510	1,680	14,060	37,020

1/ The above estimates of 1973 salmon harvests were obtained by combining estimates of commercial harvests resulting from the forecasts of total returns to some of the major salmon fisheries (refer to Table 3) with projected harvests of the remaining fisheries based on recent harvest trends.

2/ Although the majority of salmon harvested commercially in Alaska are processed as canned products, a large proportion of the harvest of certain species, in particular king and coho salmon, is processed as fresh/frozen and cured products. The number of cases presented above are not adjusted to include salmon processed by means other than canning, consequently the fish per case ratio indicated in this table may not agree with the actual cannery conversion rate of fish per case. Cases other than 48-lb. cases are converted to an equivalent number of standard 48-lb. cases.

The projected catches of chum (3.3 million), coho (1.1 million) and chinook salmon (530,000) while below recent average levels do not reflect the drastic reductions of the projected pink and sockeye catches. As there is little information on brood year escapements and subsequent survival of juvenile salmon on which to base forecasts of total returns of chum, coho and chinook salmon - except for chum salmon returns to Prince William Sound and Chignik - projected 1974 catches of these species are based almost exclusively on recent harvest trends. As the full effect of the severe winters of 1970-71 and 1971-72 on chum and coho salmon would only now be felt in 1974, it is possible that the projected 1974 catches, while adjusted to some extent, may still prove too optimistic.

CONCLUDING REMARKS

Commercial catches of Alaskan salmon since 1950 are given in Appendix B and shown graphically in Figure 2. Annual catches during this period have ranged from 21 million in 1967 to 68 million in 1970. Average annual catches, represented by horizontal bars in Figure 2, were 41 million and 51 million for the 1950's and 1960's respectively.

As apparent from Figure 2, Alaska's commercial salmon harvests have experienced a major downward trend since 1970. While the catches of 68 million in 1970 and 47 million in 1971 were generally consistent with the trend of the 1960's, the catches of 30 million in 1972 and 22 million in 1973 were below anticipated levels. In both 1972 and 1973, the smaller salmon harvests were attributable primarily to smaller catches of pink and sockeye salmon, Alaska's two most important commercial salmon species.

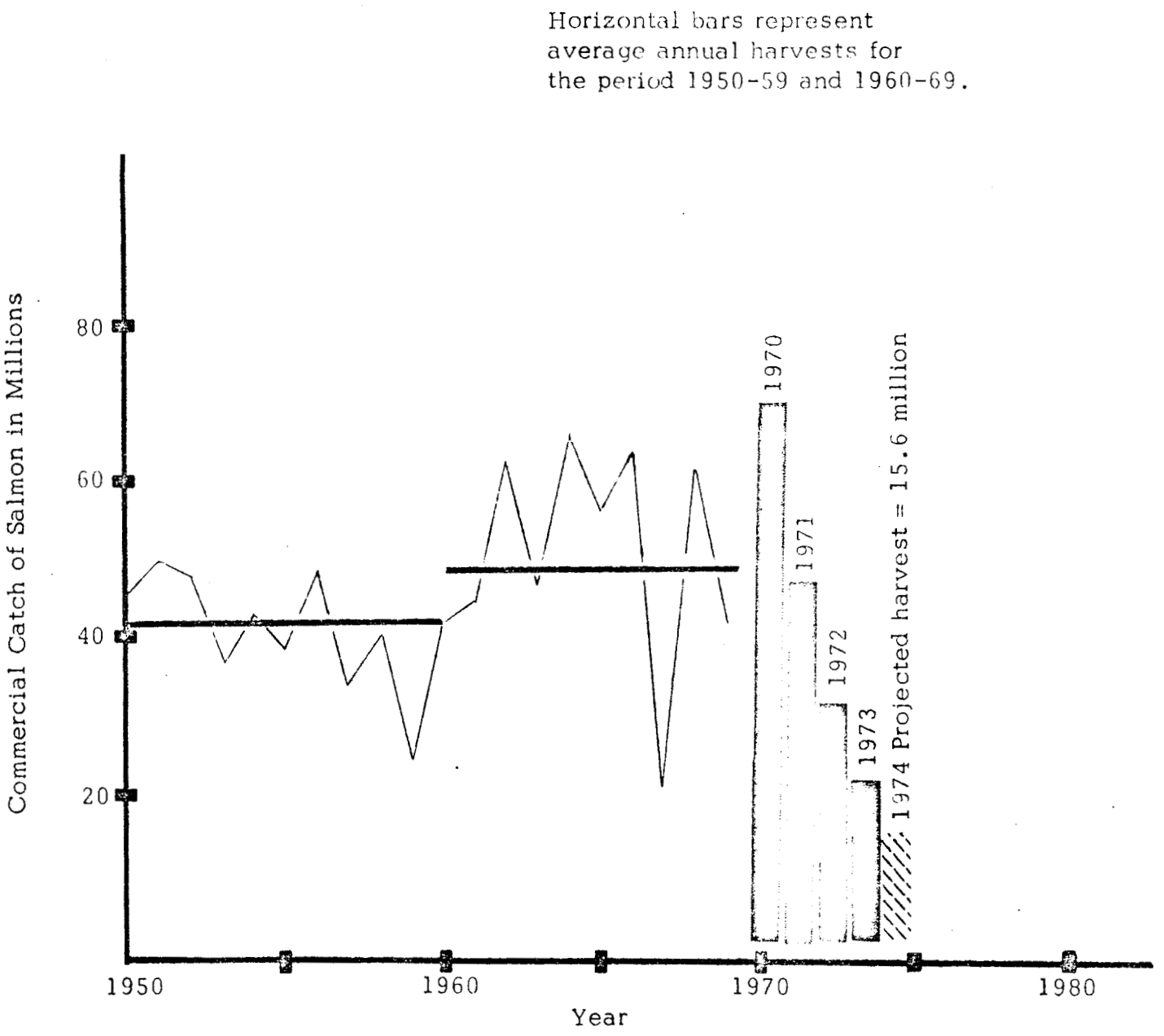
The projected commercial harvest of 15.6 million salmon for 1974, if substantially correct, would represent a continuation of the downward trend. As in 1972 and 1973, weaknesses in anticipated catches of pink and sockeye would be the primary cause of the exceptionally low projection with expected catches of chum, coho and chinook salmon being depressed to a lesser degree.

To appreciate the extent to which the 1974 projection is below historical salmon harvests, the last year in which the commercial harvest dropped below the 15.6 million projection was 1899 when only 14.4 million salmon of all species were taken. More recently, small catches occurred in 1973 (22 million), 1967 (21 million) and 1959 (25 million).

Assuming that the 1974 projection will be substantially correct, the average annual harvest for the first half of the 1970's will be approximately 37 million salmon. This is roughly 70 percent of the average harvest of 51 million during the 1960's.

Information available at this time strongly indicates that the primary factor responsible for the present depressed state of Alaska's salmon fisheries was the severe winters and springs of 1970-71 and 1971-72 and the above average mortalities subsequently induced in juvenile salmon. There is further evidence that unusually high mortalities occurred in both freshwater and early marine life stages of salmon in some areas of the state. Specific information on actual climatic conditions encountered by salmon in some areas during these severe winters will be presented in several area forecast reports soon to be released by the Department.

FIGURE 2. ANNUAL COMMERCIAL HARVESTS OF ALASKAN SALMON, 1950-1973.



Recent data obtained from pink salmon forecast studies indicates that survival during the 1972-73 winter tended to be closer to average survival rates than in the previous two winters. Whether or not this will mark the end of below average salmon production, however, remains to be seen.

In summary, the Department wishes to emphasize that the estimates of salmon harvests for 1974 presented above are dependent on 1974 salmon returns being of the magnitudes anticipated. Returns weaker than forecasted may require additional restriction of harvests to insure desired escapement goals while returns larger than forecasted may result in relaxation of regulations to insure maximum allowable harvest.

APPENDIX A. PRELIMINARY FORECASTS, FORECAST TECHNIQUES AND DISCUSSION OF ANTICIPATED 1974 SEASON FOR MAJOR SALMON FISHERIES FOR WHICH FORECASTS OF TOTAL RETURNS ARE AVAILABLE.

FORECAST AREA: Southeastern Alaska

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN·

Northern Southeastern

Point Estimate = 9.3 million

Range Estimate = 7.4 - 11.2 million

Southern Southeastern

Point Estimate = 6.8 million

Range Estimate = 4.4 - 9.2 million

Total Southeastern

Point Estimate = 16.1 million

Range Estimate = 11.8 - 20.4 million

FORECAST METHODS:

Total returns referred to in this discussion are more precisely total return indices as they represent the sum of commercial catches and escapement indices rather than estimates of total escapements.

The 1974 pink salmon forecast is based on the relationship between pre-emergent fry abundance, estuary temperatures and subsequent adult returns. Two forecasts are provided because of the apparent separation of pink salmon stocks between the northern and southern Southeastern areas. Fry abundance indices for northern Southeastern are adjusted to compensate for the large annual variation in spawner distribution between districts which is not completely indicated by the fry values alone. Similar weighting adjustments to the fry values for southern Southeastern, where variations in spawner distribution were not as obvious, resulted in an increased variation in the fry-return relationship. Therefore, the southern area forecast is based on fry densities which are not adjusted for annual variations in spawner distribution.

Inaccuracies in forecasting have occurred over the past several years. Much of that error may be related to variations in estuarine temperatures. Estuarine water temperatures during the spring months in 1972 at Juneau, for instance, were the third coldest since 1937. Likewise, at Ketchikan the 1972 water temperatures were the second coldest since 1922. The relatively high fry production during the past two years linked with poor adult returns suggests that unusually high mortality occurred during the period after the fry departed the freshwater environment. To correct for the apparent variation in estuarine survival, a combination of monthly surface water temperatures were chosen and combined with the fry indices and return values to give the closest fit between actual and predicted values of pink salmon returns. The results obtained, through multiple regression analysis, indicated that annual temperature variations in estuaries help determine return run strength, particularly in northern Southeastern. Therefore, estuarine temperatures were used to predict the 1974 return and will be considered in future forecasts.

Range estimates of returns provided here are 80 percent confidence intervals derived from the multiple regression analysis.

DISCUSSION OF 1974 FORECAST:

Northern Southeastern

The allowable catch in Northern Southeastern, based on the predicted return of 9.3 million pinks, should be near 5.3 million. The probable harvest range would be 3.4 - 7.2 million. These are based on a 4.0 million escapement index goal. The run strength will be greatest to the early run streams. Approximately 53 percent of the total return is expected to be early run fish and an estimated 80 percent of these early fish will be destined to the east side of Admiralty Island and the mainland streams (Districts 10 and 11). Areas expected to have poor returns are the early streams of Tenakee Inlet and the Icy Strait area which account for the remaining 20 percent of the early segment. The middle run segment is expected to comprise about 32 percent of the total return. Weak returns are expected to the middle run streams in Icy Straits and Peril Straits, while the middle run segment to the Gambier-Pybus Bay areas are expected to be strong. The late run segment is expected to comprise only 15 percent of the return, nearly all of which will be needed to achieve escapement goals in late run streams. Thus, in 1974, we can expect 60 percent of the harvest from the early run and about 40 percent from the middle

run with little or no harvest expected on the late run fish.

Southern Southeastern

The allowable catch in Southern Southeastern, based on the predicted return of 6.8 million pinks, is about 0.8 million. The probable harvest range would be 0 - 3.2 million. These are based on a 6.0 million escapement index goal. The only harvestable surplus is expected from the early run fish, an exception being those salmon returning to District 7 (Anan Creek area) where returns are expected to be weak. The middle and late run segments to District 2 and 3 are expected to be extremely weak except for a few isolated lake-fed streams where good returns are expected.

Prepared by: Kenneth E. Durley
Fishery Research Biologist
Juneau

FORECAST AREA: Prince William Sound

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 2.0 million

Range Estimate = 0.3 - 3.7 million

FORECAST METHODS:

Pink salmon forecasts in Prince William Sound are based on the relationship of indices of relative abundance of alevins obtained just prior to their emergence from stream gravel to subsequent adult returns.

DISCUSSION OF 1974 FORECAST:

The pink alevin index for the 1974 run is 104 per square meter. This second smallest recorded density is the result of a spawner escapement of only 0.6 million and a severe flood in September 1972.

The alevin index indicates a total pink salmon run of approximately 2.0 million fish. The distribution of spawners in 1972 and the low total returns in 1970 and 1972 (in comparison with the mean forecasts) suggest that the 1974 run will more likely fall below 2.0 million.

The spawner escapement goal for Prince William Sound is 1.5 million. This would allow a commercial harvest of 0.5 million pinks. If pink salmon in excess of spawner requirements materialize, they will return to the Eastern district.

SPECIES: Chum Salmon

PRELIMINARY FORECAST OF 1974 RETURN:

Point Estimate = 294,000

Range Estimate = 141,000 - 447,000

FORECAST METHODS:

Chum salmon may mature as three, four, five or six year old fish. Forecasts are based primarily on a relationship that exists between the chum alevin index and the subsequent return of four-year old fish, the most abundant age class.

DISCUSSION OF THE 1974 FORECAST:

The chum alevin density of 24 per square meter for the parent year 1970 is the lowest observed since 1960 and is expected to contribute approximately 80% of the 1974 chum run as four-year old fish. This density indicates a run of about 235,000 four-year chums in 1974 and a total chum run of 294,000. The chum run is also expected to be in the lower range of the forecast. Production of pink salmon from the 1970 spawning was very poor.

An escapement goal of approximately 200,000 chum salmon indicates that a harvest of about 94,000 chums could be allowed if the point forecast is substantially correct. A chum run in the lower end of the forecast range would require appropriate reductions in the harvest.

Prepared by: John D. Solf
Fisheries Research Biologist
Cordova

FORECAST AREA: Cook Inlet -- Southern and Outer districts

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 340,000

FORECAST METHODS:

The 1974 pink salmon forecast for the Southern and Outer districts of Cook Inlet was derived from the relationship between alevin density and subsequent return. Indices of alevin abundance from nine important spawning streams are obtained in the spring prior to pink fry emergence. The densities from each stream are weighed by brood year escapement and the resultant individual stream indices combined to arrive at a weighed alevin index for the two districts as a whole. This index is correlated with subsequent return and the regression line computed.

DISCUSSION OF 1974 FORECAST:

The 1972 escapement of 44,000 pink salmon was the lowest on record due in part to poor survival over the winter of 1970-1971. The average escapement for the period 1962-1971 was 211,000. The even-year average escapement for 1962-1970 was 275,000. The alevin density indices indicate fair survival over the winter of 1972-1973.

A conservative pink salmon seine season is anticipated for 1974 in the Southern and Outer districts of Cook Inlet. In order to build the even-year run to acceptable levels a total escapement of 200-300,000 pink salmon is the basic goal. Any excess in district stock areas would be available for harvest.

Prepared by: Charles Hurd
Fisheries Research Biologist
Homer

FORECAST AREA: Kodiak

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 RETURN:

Point Estimate = 2.9 million

Range Estimate = 1.9 - 5.3 million

FORECAST METHODS:

A forecast of the 1974 pink salmon return to the Kodiak area was obtained by relating alevin indices of relative abundance (densities) to subsequent adult returns via linear regression analysis. All indexing data collected since 1963 were used to establish this relationship. Standard statistical confidence limits normally used to provide a range estimate for a predicted return were not used this year because of the extreme variation of observations used in the analysis. Instead, a forecast range was obtained by using forecasts from alternative methods which yielded higher and lower forecasts for the 1974 return.

DISCUSSION OF 1974 FORECAST:

Pre-emergent sampling indicated good overwinter survival from an extremely low brood year escapement in 1972. A fairly close correlation between magnitude of alevin densities and magnitude of escapements was noted for most of the 31 index streams. Spring sampling of these streams yielded a 1973 alevin index of 8.82; the lowest even year index recorded and one representing only 47% of the even year average. This low alevin index indicates a total pink salmon return in 1974 of about 2.9 million fish. A lower forecast of 1.9 million resulted from using a simple escapement-return relationship. A higher forecast of 5.3 million resulted from a summation of district forecasts determined from linear regression analysis on even year data. Thus a range estimate of 1.9 to 5.3 million was given to the point estimate of 2.9 million fish.

Preliminary findings by the Fisheries Research Institute (University of Washington) during their 1973 estuarine tow-netting studies at Kodiak tend to support this prediction.

Since the Kodiak area pink salmon spawner escapement goal for even year runs is 2.5 to 3.0 million very strict harvest regulations should be anticipated in 1974 to insure minimum escapement requirements. On the basis of the predicted range of 1.9 - 5.3 million, an escapement goal of 3 million pink salmon would indicate that the harvest would not exceed 2.3 million while a total return equal to or less than the point forecast of 2.9 million would allow little, if any, harvest.

A break-down by major districts and catch-associated districts as to strengths and weaknesses of the expected return is indicated below:

(1) Afognak District: District alevin density was 75% below the even year average. Distribution spotty. Afognak, Danger, and Perenosa rivers should be the best producers in this district.

(2) Westside District: District alevin density was 70% below the even year average. The key systems of Red River, Sturgeon, Karluk and Little rivers had extremely poor brood year escapements. District return is expected to be low and spotty with important producers such as Terror, Uganik, and Uyak rivers yielding mediocre returns.

(3) Alitak District: District alevin density was 48% below the even year average. Dog Salmon and Humpy rivers had the poorest densities ever recorded; Deadman River should be the major contributor to this district.

(4) General District: District alevin density was the best of the four districts, being only 30% below the even year district average. Average and above average densities occurred in the Northend, (from Sharatin Creek to Hurst Creek). Kaiugnak and Seven Rivers on the Southend were mediocre. Poor returns are expected to the remainder of the district.

Prepared by: Larry Malloy
Fishery Biologist
Kodiak

FORECAST AREA: Chignik

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Early (Black Lake) Run

Point Estimate = 400,000

Interval Estimate = 330,000 - 460,000

Late (Chignik Lake) Run

Point Estimate = 590,000

Interval Estimate = 320,000 - 960,000

FORECAST METHODS:

Early Run

The forecast for the early or Black Lake run is calculated as the number of sockeye returning to the system prior to July 1. Black Lake fish continue to enter Chignik River well into July, and generally, fish bound for Chignik Lake enter the system during the latter part of June. The assumption is made that the number of Black Lake fish entering after July 1 is approximately equal to the number of Chignik Lake fish entering prior to July 1.

The four major age groups in order of importance are those of age 1.3, 2.3, 1.2 and 2.2. Seven minor age classes are represented by such small numbers that they are not considered in the forecast. During the past ten years, .3 ocean fish have constituted about 85 percent of the total early run. The magnitude of their return has in past years been closely related to the number of .2 ocean fish returning in the year previous and this provides the basis for forecasting the return of .3 ocean fish.

Age data obtained from scale samples collected at Chignik from 1954 to present is used. A regression analysis of .2 ocean fish to .3 ocean fish the following year shows a 1974 return of only 291,000 .3 ocean fish. The ten-year average return of .2 ocean fish is 43,000. Assuming an average return of this age group, a return of approximately 334,000 fish can be expected prior to July 1.

Late Run

Forecasts of sockeye returns to Chignik Lake based on techniques used for the early run have not been accurate. Until a more reliable technique is developed, average returns and the magnitude of parent escapements are used to indicate probable magnitudes of returning runs. Returns over the past ten years have averaged 547,000 fish, ranging from 316,000 to 963,000. The parent year escapement in 1968 (the majority of Chignik Lake sockeye are five-year fish) was 245,000. Using the past 14-year average return per spawner of 2.43 a return of approximately 590,000 is indicated. The ten-year range is used as an interval estimate.

DISCUSSION OF 1974 FORECAST:

Early Run

The predicted return of 400,000 sockeye prior to July 1 would be very similar to the early run in 1972. Since this size of return would fall in the upper end of the range of escapement requirements, 350,000 to 400,000, little fishing can be expected prior to July 1. A catch of less than 50,000 is thus indicated.

Late Run

The expected return of 590,000 sockeye would allow for a harvest of approximately 340,000 fish, however should the 1974 return fall at the lower end of probable range, namely 320,000, a catch of only about 70,000 fish could be allowed.

Prepared by: Arnold R. Shaul
Area Management Biologist
Chignik Area

FORECAST AREA: Chignik

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 200,000

The 1974 pink salmon return is expected to be very poor. Extremely poor escapements in 1972 and only fair egg and fry survival during the 1972-73 winter were responsible for the low fry densities observed. Densities in the Eastern, Western and Perryville districts were the lowest observed since 1969. The 1974 return is expected to be somewhat larger than the 1972 return of 113,000 but less than any other even-year return since 1960. Thus a run of roughly 200,000 fish might be expected. This would allow for no significant harvest.

SPECIES: Chum Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 50,000

The 1974 Chignik area chum salmon forecast is based on the relative survival of pink salmon from the 1970 brood year. This survival rate is applied to the chum escapement of 1970 as most chums in the Chignik area mature as four-year fish. Application of this method separately to the Eastern, Western, Perryville and Chignik Bay districts yields a total area forecast of 45,700 chums for 1974. A return of this magnitude would not allow any significant harvest.

Prepared by: Arnold Shaul
Area Management Biologist
Chignik Area

Phillip Rigby
Assist. Area Management Biologist
Chignik Area

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 5.3 million

FORECAST METHODS:

Most Bristol Bay sockeye mature four to six years from time of spawning. The run in 1974 should, however, be dominated by five and six year old fish from the large Kvichak escapements of 1969 and 1970.

Forecasting by ADF&G is on the basis of one or more of the following methods:

(1) Escapement-return relationships from historical data provide estimates of total production from each brood year escapement. Average maturity schedules are then applied to determine probable numbers of sockeye salmon returning each year.

(2) On three river systems, numbers of smolt migrating to the ocean are enumerated annually. Total adult returns are then estimated from survival records by system, and marine maturity schedules are applied to these total returns to give probable numbers of adult salmon returning each year.

(3) For all systems relationships have been developed between returning adult fish in one year and adults returning in the following year from the same age group of smolt and the same parent escapement.

In each system one or more of the above methods may be applied with the resulting system forecasts being added for all systems to arrive at the total Bristol Bay forecast.

Evaluation of smolt production from escapements that will produce the 1974 run indicates that for the Kvichak, Naknek and Ugashik systems, the smolt per spawner was good in 1969 but far below average in 1970. The return of adult fish in 1973 from the 1969

escapement indicates that although good production of smolt per spawner was measured, survival in the estuary and on the high seas was abnormally low. High seas sampling by Fisheries Research Institute (FRI) in the summer of 1973 substantiated low survival. Reasons for the poor survival are probably temperature dependent. The spring seasons of 1971 and 1972 were the coldest recorded in Bristol Bay since 1951. The low temperatures extended to the eastern Bering Sea where the International Pacific Halibut Commission found ocean bottom water temperatures to be lower in 1971 and 1972 than any year since 1965.

Due to the abundant evidence that survival of salmon expected to return in 1974 will be substantially below average, use of normal ADF&G forecasting methods based on average marine survival is not desirable. In this situation the FRI high seas forecast appears more acceptable, since it was most accurate in 1973 and is based on sampling that took place in late summer of 1973. By this time most unusual marine mortalities should have occurred.

DISCUSSION OF 1974 FORECAST:

The 1974 forecast is for a run of 5.3 million sockeye of which 72% are 2-ocean and 28% are 3-ocean fish. A much greater return of 2-ocean fish would have been expected under normal conditions, but the poor returns in 1973 and limited occurrence in high seas sampling indicates poor survival of immatures after they left the rearing areas and entered the marine environment.

The 1974 forecast of 5.3 million sockeye contains no adjustment for probable high seas harvest by foreign fisheries. Any catch of Bristol Bay sockeye by the Japanese high seas fishery in 1974 must be subtracted from the 5.3 million forecast to determine the number of sockeye expected to arrive in Bristol Bay.

Escapement requirements in 1974 are 9.5 million, nearly twice the forecasted total run of 5.3 million. As a result the major districts will require all forecasted sockeyes for escapement. No harvest can be anticipated in the Naknek-Kvichak , Egegik, or Ugashik districts, and only 12,000 sockeye may be taken from the Nushagak district. The small, isolated Togiak district will have an estimated harvest of 215,000.

Fisheries on other salmon species in Bristol Bay may harvest some sockeye incidentally, but regulations will be designed to minimize this incidental harvest.

Prepared by: Robert Paulus
Fisheries Research Biologist
Anchorage

FORECAST AREA: Bristol Bay - Nushagak District Only

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1974 TOTAL RETURN:

Point Estimate = 300,000

Range Estimate = 200,000 - 400,000

FORECAST METHODS:

Forecasts of pink salmon returns to the Nushagak district of Bristol Bay are based on escapement-return relationships. Severe winter and spring weather conditions prevent the collection of adequate pre-emergent fry data which forms the basis for pink salmon forecasting in other areas of the state. Escapement-return data is available since 1958. Escapements have been enumerated at counting towers since 1960.

DISCUSSION OF 1974 FORECAST:

In recent years, pink salmon returns to the Nushagak district have been of significant magnitude only on the even-years. An escapement of 59,000 in 1972 is expected to produce a return of approximately 300,000 pink salmon in 1974. For comparison, returns since 1958 have varied from 127,000 in 1970 to 3.9 million in 1968.

An established escapement goal of 600,000 - 900,000 pink salmon for the Nushagak system indicates that no harvest is expected for 1974. Thus, the closure of the Nushagak district through July 22 necessitated by the extremely poor sockeye returns expected in 1974, should also be beneficial to the pink salmon return.

The Nushagak district generally contributes in excess of 90 percent of all pink salmon harvested in Bristol Bay.

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APPENDIX B. ANNUAL ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND STATISTICAL REGION, 1950-1973

APPENDIX TABLE B. ANNUAL ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND STATISTICAL REGION, 1950-1973.

		Number of Fish in Thousands						No. of 48-lb. Cases in
		Species						
Year	Statistical Region 1/	Chinook	Sockeye	Coho	Pink	Chum	Total	Thousands 2/
1950	SOUTHEASTERN	379	552	1,652	9,424	4,779	16,786	1,199
	CENTRAL	137	5,947	762	11,978	2,515	21,339	1,465
	WESTERN	95	7,267	83	30	447	7,922	644
	Subtotal	611	13,766	2,497	21,432	7,741	46,047	3,308
1951	SOUTHEASTERN	474	820	3,310	22,211	4,123	30,938	2,028
	CENTRAL	213	4,136	645	6,185	2,040	13,219	1,068
	WESTERN	102	4,697	76	21	454	5,350	389
	Subtotal	789	9,653	4,031	28,417	6,617	49,507	3,485
1952	SOUTHEASTERN	528	919	1,746	9,819	4,179	17,191	1,321
	CENTRAL	115	4,341	617	10,012	3,463	18,548	1,456
	WESTERN	92	11,664	70	47	522	12,395	797
	Subtotal	735	16,924	2,433	19,878	8,164	48,134	3,574
1953	SOUTHEASTERN	498	1,376	1,164	4,980	3,542	11,560	978
	CENTRAL	112	3,763	387	10,602	3,132	17,996	1,351
	WESTERN	102	6,654	31	88	619	7,494	534
	Subtotal	712	11,793	1,582	15,670	7,293	37,050	2,863
1954	SOUTHEASTERN	398	1,208	1,771	8,909	4,242	16,528	1,303
	CENTRAL	85	3,190	679	12,576	3,323	19,853	1,395
	WESTERN	128	5,014	59	688	820	6,709	397
	Subtotal	611	9,412	2,509	22,173	8,385	43,090	3,095
1955	SOUTHEASTERN	372	681	1,338	9,334	1,527	13,252	840
	CENTRAL	74	2,675	468	14,758	1,631	19,606	1,163
	WESTERN	135	5,148	27	32	342	5,684	383
	Subtotal	581	8,504	1,833	24,124	3,500	38,542	2,386
1956	SOUTHEASTERN	239	921	935	13,472	2,736	18,303	1,032
	CENTRAL	82	3,432	495	11,940	3,674	19,623	1,349
	WESTERN	137	10,252	52	125	791	11,357	641
	Subtotal	458	14,605	1,482	25,537	7,201	49,283	3,022

APPENDIX TABLE B. ANNUAL ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND STATISTICAL REGION, 1950-1973 (cont.)

Year	Statistical Region 1/	Number of Fish in Thousands						No. of 48-lb. Cases in Thousands 2/
		Species						
		Chinook	Sockeye	Coho	Pink	Chum	Total	
1957	SOUTHEASTERN	298	1,031	1,217	6,858	3,369	12,773	905
	CENTRAL	57	2,071	301	6,659	4,362	13,450	1,002
	WESTERN	158	6,631	87	4	548	7,428	557
	Subtotal	513	9,733	1,605	13,521	8,279	33,651	2,464
1958	SOUTHEASTERN	323	971	955	9,836	2,767	14,852	1,181
	CENTRAL	45	1,636	459	14,452	3,244	19,836	1,354
	WESTERN	182	3,460	193	1,809	613	6,257	437
	Subtotal	550	6,067	1,607	26,097	6,624	40,945	2,972
1959	SOUTHEASTERN	359	777	1,094	7,851	1,247	11,328	759
	CENTRAL	47	1,937	332	3,057	1,908	7,281	573
	WESTERN	195	5,249	76	22	886	6,428	446
	Subtotal	601	7,963	1,502	10,930	4,041	25,037	1,778
1960	SOUTHEASTERN	310	588	721	2,985	1,019	5,623	318
	CENTRAL	41	2,835	618	12,313	3,682	19,489	1,205
	WESTERN	196	14,411	66	782	1,923	17,378	1,049
	Subtotal	547	17,834	1,405	16,080	6,624	42,490	2,572
1961	SOUTHEASTERN	230	744	889	12,638	2,559	17,060	1,224
	CENTRAL	31	3,030	357	8,736	2,080	14,234	940
	WESTERN	243	12,307	67	132	991	13,740	1,048
	Subtotal	504	16,081	1,313	21,506	5,630	45,034	3,212
1962	SOUTHEASTERN	206	772	1,223	11,585	1,996	15,782	935
	CENTRAL	42	3,534	692	29,297	4,024	37,589	2,013
	WESTERN	213	4,990	124	2,981	1,128	9,436	528
	Subtotal	461	9,296	2,039	43,863	7,148	62,807	3,476
1963	SOUTHEASTERN	258	678	1,275	19,145	1,479	22,835	1,216
	CENTRAL	35	2,437	627	14,976	2,350	20,425	1,135
	WESTERN	208	3,101	121	154	635	4,219	305
	Subtotal	501	6,216	2,023	34,275	4,464	47,479	2,656

APPENDIX TABLE B. ANNUAL ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND STATISTICAL REGION, 1950-1973 (cont.)

Number of Fish in Thousands — No. of 48-lb. Cases in Thousands 2/

Year	Statistical Region 1/	Species: Chinook	Sockeye	Coho	Pink	Chum	Total
1964	SOUTHEASTERN	357	924	1,588	18,581	1,936	23,386
	CENTRAL	22	3,198	866	24,945	4,160	33,191
	WESTERN	260	5,839	105	1,747	1,179	9,130
	Subtotal	639	9,961	2,559	45,273	7,275	65,707
1965	SOUTHEASTERN	287	1,085	1,548	10,880	1,474	15,274
	CENTRAL	31	4,229	393	9,464	1,635	15,752
	WESTERN	265	24,732	57	3	271	25,328
	Subtotal	583	30,046	1,998	20,347	3,380	56,354
1966	SOUTHEASTERN	308	1,054	1,227	20,438	3,273	26,300
	CENTRAL	24	4,458	574	17,028	2,574	24,658
	WESTERN	208	9,562	119	2,585	609	13,083
	Subtotal	540	15,074	1,920	40,051	6,456	64,041
1967	SOUTHEASTERN	301	972	866	3,111	1,810	7,060
	CENTRAL	26	3,049	450	3,409	1,198	8,132
	WESTERN	284	4,557	172	39	646	5,698
	Subtotal	611	8,578	1,488	6,559	3,654	20,890
1968	SOUTHEASTERN	332	831	1,543	25,085	2,644	30,435
	CENTRAL	20	4,260	875	16,664	2,837	24,656
	WESTERN	259	3,039	333	2,977	601	7,209
	Subtotal	611	8,130	2,751	44,726	6,082	62,300
1969	SOUTHEASTERN	314	812	596	4,870	561	7,153
	CENTRAL	38	3,650	274	20,565	1,644	26,171
	WESTERN	287	6,931	263	332	770	8,583
	Subtotal	639	11,393	1,133	25,767	2,975	41,907
1970	SOUTHEASTERN	322	668	759	10,657	2,446	14,851
	CENTRAL	33	6,020	647	19,263	3,609	29,571
	WESTERN	291	20,946	121	1,228	1,445	24,031
	Subtotal	646	27,634	1,527	31,147	7,500	68,454

Year	Statistical Region 1/	Cases in Thousands 2/
1964	SOUTHEASTERN	1,263
	CENTRAL	1,724
	WESTERN	563
	Subtotal	3,550
1965	SOUTHEASTERN	758
	CENTRAL	985
	WESTERN	1,525
	Subtotal	3,268
1966	SOUTHEASTERN	1,562
	CENTRAL	1,532
	WESTERN	897
	Subtotal	3,991
1967	SOUTHEASTERN	431
	CENTRAL	609
	WESTERN	424
	Subtotal	1,464
1968	SOUTHEASTERN	1,372
	CENTRAL	1,437
	WESTERN	359
	Subtotal	3,168
1969	SOUTHEASTERN	292
	CENTRAL	1,412
	WESTERN	519
	Subtotal	2,223
1970	SOUTHEASTERN	676
	CENTRAL	1,662
	WESTERN	1,227
	Subtotal	3,565

APPENDIX TABLE B. ANNUAL ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND STATISTICAL REGION, 1950-1973 (cont.)

Year	Statistical Region 1/	Number of Fish in Thousands: Species: Chinook	Sockeye	Coho	Pink	Chum	Total	No. of 48 lb. Cases in Thousands 2/
1971	SOUTHEASTERN	334	623	914	9,345	1,946	13,162	687
	CENTRAL	45	3,611	487	14,133	4,317	22,593	1,425
	WESTERN	283	9,945	46	51	1,417	11,742	787
	Subtotal	662	14,179	1,447	23,529	7,680	47,497	2,899
1972 3/	SOUTHEASTERN	254	926	1,357	11,903	2,308	16,748	748
	CENTRAL	39	3,054	211	3,350	2,668	9,322	679
	WESTERN	218	2,644	58	124	1,377	4,421	299
	Subtotal	511	6,624	1,626	15,377	6,353	30,491	1,726
1973 3/	SOUTHEASTERN	322	996	756	6,043	1,287	9,404	409
	CENTRAL	28	2,535	338	3,297	2,164	8,362	611
	WESTERN	175	935	266	54	2,079	3,509	137
	Subtotal	525	4,466	1,360	9,394	5,530	21,275	1,157

Data Sources

i) Alaska Department of Fish and Game Statistical Leaflets thru No. 23

ii) Alaska Department of Fish and Game Statistics Section. Unpublished data.

iii) Alaska Fisheries Reports, 1954-59. Bureau of Commercial Fisheries, U.S. Fish and Wildlife Service.

1/ For the purpose of reporting Alaska commercial fisheries statistics, the statistical regions are defined as follows:

SOUTHEASTERN: Dixon Entrance to Cape Suckling

CENTRAL: Cape Suckling to Seal Cape on the southwestern tip of Unimak Island.

WESTERN: Seal Cape to, and including, the Aleutian Islands and the Bering Cape north through Kotzebue Sound.

2/ Although the majority of commercially harvested salmon in Alaska are processed as canned products, in some regions certain species (such as king and coho salmon in the Southeastern region) are processed

predominantly as fresh/frozen or cured products. These case pack figures do not include salmon processed in ways other than canning.

3/ Preliminary data.